

## SUBJECT TEACHING GUIDE

### G779 - Fundamentals of Biomolecular Engineering

#### Degree in Chemical Engineering First Degree in Chemical Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Chemical Engineering First Degree in Chemical Engineering			Type and Year	Compulsory. Year 2 Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Balances, Biotechnology, Separation, Chemical Reaction Engineering, Reactor Design, Assessment and Transformation of Resources Module: Compusory Training Industrial Chemistry				
Course unit title and code	G779 - Fundamentals of Biomolecular Engineering				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR				
Name of lecturer	IGNACIO FERNANDEZ OLMO				
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 5. DESPACHO I. FERNANDEZ OLMO (S5004A)				
Other lecturers	JONATHAN ALBO SANCHEZ JAVIER PINEDO ALONSO				

### 3.1 LEARNING OUTCOMES

- To demonstrate the knowledge about the main types of biomolecules and living beings
- To understand the basic concepts about the organization and behaviour of living beings at molecular level
- To understand the energy sources and metabolite synthesis in cells
- To understand how the metabolic activity is regulated in the cell
- To demonstrate the knowledge about the engineering applications of cells and their molecules
- To demonstrate the knowledge about the social and ethic aspects related to the rapid growth of the biochemical and biomolecular technology

### 4. OBJECTIVES

- To show the main biomolecules in living beings
- To show how cells work at molecular level; this will lead to their engineering applications
- To introduce the main engineering applications of cells and their molecules

### 6. SUBJECT PROGRAM

#### CONTENTS

1	Fundamentals of molecular and cellular biology 1.1. Introduction 1.2. Biomolecules in living beings 1.3. Cells: types and growth requirements
2	Enzymology 2.1. Enzymes: characteristics, their production and main applications 2.2. Homogeneous enzyme kinetics 2.3. Introduction to immobilized enzyme systems
3	How cells work 3.1. Cellular metabolism 3.2. Gen expression and storing 3.3. Major metabolic pathways and their regulation
4	Introduction to molecular genetics 4.1. Fundamentals of genetic engineering and its application 4.2. Molecular diagnosis 4.3. Social and ethic aspects in biotechnology
5	Bioprocess engineering 5.1. Cellular growth and metabolite synthesis 5.2. Batch and continuous cultures 5.3. Applications in biotechnology: biomolecules production

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
The contents of topics 1 and 2 will be evaluated at the 8th week. In case of an off-site scenario, the evaluation will be based on short time-limited questionnaires and tasks. The minimum rate must be 4/10. It accounts for 35 %	Written exam	Yes	Yes	35,00
The contents of topics 3 and 5 will be evaluated at the 15th week. In case of an off-site scenario, the evaluation will be based on short time-limited questionnaires and tasks. The minimum rate must be 4/10. It accounts for 30 %	Written exam	Yes	Yes	30,00
An individual or team work will be developed. In case of an off-site scenario, team works would be replaced by individual works. It accounts for 25 %	Work	No	No	25,00
Topic 4: Writing of a summary of the student's opinion on the subject of transgenic foods based on a face-to-face discussion. In case of an off-site scenario, the summary will be done after watching videos dealing with this topic. It accounts for 10 %.	Work	No	No	10,00
TOTAL				100,00
Observations				
The continuous evaluation requires to do exams 1 and 2, writing a summary on transgenic food, and the delivery of an individual or team work. If the student chooses a team work, it will be presented to the audience				
Observations for part-time students				
In the event that there are no alternative options that allow the part-time student to participate regularly in face-to-face teaching activities, the student may be subject to a single assessment process, consisting of taking an exam in the ordinary call.				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

- "Bioprocess Engineering. Basic Concepts". Shuler, M.L., Kargi, F. Ed. Prentice Hall, 2002  
 "Biochemical engineering fundamentals". Bailey, J.Y., Ollis, D.V. Ed. McGraw-Hill, 1986